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Notes on the Lepidoptera and other noteworthy insects observed on Selvagem Grande Island (Madeira, Portugal)

With 3 plates and 2 appendixes

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ABSTRACT: The insect fauna of the Selvagens Islands (Madeira, Portugal), particularly in what concerns migrant species, is still imperfectly known. According to the literature, at least 166 species have been recorded (including 24 species of Lepidoptera), but several knowledge gaps still exist. A total of 31 endemic insect *taxa* occur on this archipelago. Between 2006 and 2009, 14 species (and another *taxon*) of Lepidoptera were recorded on Selvagem Grande of which 8 are new (or have no previously published records) for the Selvagens Islands: *Pyrausta sanguinalis* (Linnaeus), *Uresiphita gilvata* (Fabricius), *Agrius convolvuli* (Linnaeus), *Hippotion celerio* (Linnaeus), *Vanessa atalanta* (Linnaeus), *Hypena obsitalis* (Hübner), *Eublemma parva* (Hübner), *Caradrina clavipalpis* (Scopoli); the dragonfly *Sympetrum fonscolombii* (Selys) is also new for the Selvagens and the cockroach *Periplaneta americana* (Linnaeus) is confirmed. Observations on other noteworthy insects are also included. The total number of Lepidoptera species known from the Selvagens stands now at 32 and the total number of confirmed insect species at a minimum of 176. Finally, it is discussed that this number may be as high as 214 species, if previously undetermined species in the literature are taken into account.

Keywords: Selvagens Islands, Crambidae, Sphingidae, Nymphalidae, Noctuidae, Odonata, new records.

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RESUMO: A fauna de insectos das Ilhas Selvagens (Madeira, Portugal) é ainda imperfeitamente conhecida, em especial no que diz respeito às espécies migradoras. De acordo com a literatura, pelo menos 166 espécies de insectos (incluindo 24 espécies de Lepidoptera) foram registadas nestas ilhas, mas ainda existem várias lacunas neste conhecimento. Um total de 31 *taxa* de insectos endémicos está presente neste arquipélago. De 2006 a 2009 foram registadas 14 espécies (e um outro táxon determinado a nível genérico) de Lepidoptera na ilha Selvagem Grande, das quais 8 são novas (ou sem registos prévios publicados) para as Ilhas Selvagens: *Pyrausta sanguinalis* (Linnaeus), *Uresiphita gilvata* (Fabricius), *Agrius convolvuli* (Linnaeus), *Hippotion celerio* (Linnaeus), *Vanessa atalanta* (Linnaeus), *Hypena obsitalis* (Hübner), *Eublemma parva* (Hübner), *Caradrina clavipalpis* (Scopoli); a libélula *Sympetrum fonscolombii* (Selys) é também nova para as Selvagens e confirma-se a presença de *Periplaneta americana* (Linnaeus). Observações sobre outros insectos notáveis são também apresentadas. O número total de espécies de Lepidoptera conhecidas das Selvagens é agora de 32 e o número total de espécies de insectos confirmadas é de um mínimo de 176. Por fim, argumenta-se que o número total poderá atingir as 214 espécies, se forem tidos em consideração *taxa* não determinados ao nível da espécie, referidos na literatura.

Palavras-chave: Ilhas Selvagens, Crambidae, Sphingidae, Nymphalidae, Noctuidae, Odonata, novos registos.

INTRODUCTION

The Selvagens Islands are a small and very old oceanic archipelago which is part of the Autonomous Region of Madeira (Portugal), and are classified as a nature reserve since 1971 (e.g. ZINO, 1985); they encompass three main islands, Selvagem Grande, Selvagem Pequena and Ilhéu de Fora, together with several very small islets. Selvagem Grande (ca. 30° 08' N, 15° 52' W) is the largest island of the Selvagens archipelago, with an area of approximately 2.68 km²; this island is mostly bordered by steep cliffs and attains 153 m at its highest point (Pico da Atalaia); the top of the island is relatively flat, where the altitude is of ca. 100 m on average; it lies 291 km SSE of Madeira Island, 175 km NNE of Tenerife (Canary Islands) and 375 km NW to the nearest point on the African coast (Morocco); see a detailed description in FIGUEIRA (1964). The island is very dry with rare and irregular rain, and a sparse and now highly modified vegetation cover (including both introduced and native species), composed by well adapted plants such as *Suaeda vera* Forssk. Ex. J. F. Gmel., *Schizogyne sericea* (L. f.) DC, and *Mesembryanthemum crystallinum* L. (see BORGES *et al.*, 2008 for a full list of species).

The insect fauna of the Selvagens Islands has been irregularly studied throughout the years. Its richness started to be unravelled in 1854, when Wollaston described six new Coleoptera species from those islands in his *Insecta Maderensia*, including the endemic *Deucalion oceanicum* among other also endemic species (WOLLASTON, 1854); those represented the first scientific insect records from the Selvagens. Soon after, five more Coleoptera species were reported (WOLLASTON, 1860), and a total number of 24 Coleoptera was listed just a few years later (WOLLASTON, 1865)¹. The insects of these islands were subsequently studied by other authors, those studies being frequently the result of very short and limited visits, mostly focused on one or few insect groups (e.g. FEA, 1883; FAUVEL, 1897a, b; GARRETA, 1911; among others), and new species were added very progressively and incompletely.

From the second half of the 20th century a few scientific expeditions to the Selvagens took place, being carried out in a more comprehensive manner than previous historical visits. For its relevance, the July 1963 multidisciplinary expedition, organized by the Museu Municipal do Funchal (see PICKERING & MAUL, 1964) should be mentioned, as it started a process that ultimately would lead to the declaration of this archipelago as a nature reserve; from then onwards more regular visits were paid to the islands (see e.g. QUARTAU, 1975; see also BOIEIRO *et al.*, 2015). For their entomological relevance other expeditions must also be here referred to, namely those that took place in February 1976 (OROMI *et al.*, 1978 and references therein), in May 1980 (e.g. QUARTAU, 1981a), in August 1984 (ERBER & WHEATER, 1987) and in May 1999 (ARECHAVALETA

¹ Wollaston failed to disembark on Selvagem Grande in January 1858, on his way to the Canary Islands, and therefore his descriptions were based initially over specimens collected by T. S. Leacock, who visited the Selvagens in the spring of 1851, and secondly over specimens offered to him by the Barão do Castello de Paiva obtained from a master of a Portuguese ship who visited the Selvagens (e.g. WOLLASTON, 1854: 431, 433 and 1860: 85).

et al., 2000); a number of faunistic papers was then produced over the years based on the results of each of such scientific visits (e.g. EVERS, 1981; QUARTAU, 1981b; OROMI, 1983; SOUSA, 1984-85; ASSING, 2000; BELLÉS, 2001; among others).

The first attempt at presenting a full list of the insect fauna of the Selvagens Islands was made by OROMI (1983), where 135 *taxa* were included, but only 115 of those determined to species. The recent work listing all species for Madeira and the Selvagens (BORGES *et al.*, 2008), resulting from the effort of a vast team of specialists, included a total of 148 confirmed insect species for the Selvagens Islands (see also notes in Appendix 2); since then, according to the literature, at least another 18 species were added by different authors: PITA *et al.* (2009): 1 hoverfly species (Diptera: Syrphidae), AGUIAR *et al.* (2013): 3 aphid species (Hemiptera: Aphididae), STÜBEN (2016, 2017): 11 species (10 Coleoptera, 1 Lepidoptera), KRATOCHWIL *et al.* (2018): 1 bee species (Hymenoptera: Halictidae) and AGUIAR *et al.* (2019): 2 jumping plant-lice species (Hemiptera: Psylloidea); note that 5 Hymenoptera species (Braconidae) recorded by ACHTERBERG & AGUIAR (2009), including one new endemic species, as well as an Aphididae (Hemiptera) recorded by PITA *et al.* (2009), had been already included in BORGES *et al.* (2008). Accordingly, currently the total number of insect species recorded for the Selvagens archipelago stands at a minimum of 166. Of these, 76 are Coleoptera (the most speciose Order). The Lepidoptera are represented by fewer species: 23 were listed by AGUIAR & KARSHOLT (2006), and STÜBEN (2016) added *Utetheisa pulchella* (Linnaeus, 1758). A high degree of endemism occurs, with 31 insect *taxa* being unique to this group of islands, on current knowledge (Appendix 1).

A number of *taxa* included both in OROMI *et al.* (1978) and in ARECHAULETA *et al.* (2000), some of which may represent potentially new undescribed endemic species, seem to have not been considered in BORGES *et al.* (2008); as it is beyond the scope of this work to present the exact absolute number of species yet recorded in literature for the Selvagens, this lateral issue is briefly discussed in the final remarks of this note.

In this modest contribution to the knowledge of the insect fauna of the Selvagens Islands, observations gathered by the author are presented, both on new species for the islands and on species for which little information seems to be available in literature.

METHODS

Regular visits were paid to the Selvagens Islands (mainly Selvagem Grande) by the author, while taking part of scientific studies focused on seabird ecology (e.g. ALONSO *et al.*, 2008; MATIAS *et al.*, 2009; SILVA *et al.*, 2015). Non-systematic notes were taken on the insects observed (with an emphasis on the Lepidoptera) on Selvagem Grande across four consecutive years (2006-2009) during the following periods (year: day/month): 2006: 19/06 – 12/08, 02/09 – 20/09; 2007: 15/05 – 31/05, 02/07 – 24/08, 12/09 – 03/10; 2008: 10/06 – 01/07; 2009: 09/06 – 23/06 (a total of 224 days). These notes are presented as a commented systematic list; dates are given in the format “day.month.year”. Systematic order of the Lepidoptera follows AGUIAR & KARSHOLT (2006). The list of *taxa* presented by BORGES *et al.* (2008) was used as a main primary reference to determine the relevance of each of the recorded species. No specimens were collected; photographs were obtained to document some records. Geographical coordinates of the locations mentioned are 30° 08' 25.95" N, 15° 52' 09.37" W, alt. ca. 10 m (Baía das Cagarras) and 30° 09' 03.05" N, 15° 51' 41.93" W, alt. ca. 90 m (Chão dos Caramujos).

RESULTS

A total of 14 species (and another *taxon* determined only to genus level) of Lepidoptera were recorded from 2006 to 2009; according to the literature (AGUIAR & KARSHOLT, 2008 and STÜBEN, 2016), 8 are new species for the Selvagens Islands (but previously recorded from Madeira Island), raising to 33 the number of Lepidoptera species known from this archipelago (Appendix 2). Together with the dragonfly *Sympetrum fonscolombii* (Selys), here recorded for the first time, and the cockroach *Periplaneta americana* (Linnaeus) (see ARECHAULETA *et al.*, 2000), a minimum of 172 insect species are now known from the Selvagens. Details are presented below, as a commented systematic list of species; for each *taxon*, information is organized as number of individuals, followed by date, place and notes.

SYSTEMATIC LIST

LEPIDOPTERA

Pterophoridae

***Agdistis* sp.** 1, 13.06.2009, Baía das Cagarras, photos; attracted to light at night. Two species in this genus have been recorded from the Selvagens: *A. bifurcatus* Agenjo, 1952 and *A. salsolae* Walsingham, 1908 (CARVALHO, 1995; AGUIAR & KARSHOLT, 2006, 2008); however, it is not possible to identify individuals to species level from photographs.

Crambidae

***Pyrausta sanguinalis* (Linnaeus, 1767).** 1, 17.06.2008, Baía das Cagarras, photos (Plate I: Fig. 1). New for the Selvagens Islands; recorded from Madeira Island and the Canary Islands (see AGUIAR & KARSHOLT, 2006, 2008).

***Uresiphita gilvata* (Fabricius, 1794).** 1, 13.06.2009, Baía das Cagarras, photos (Plate I: Fig. 2); attracted to light at night. New for the Selvagens Islands (see BORGES *et al.*, 2008). Recorded from Madeira Island and the Canary Islands (see CARVALHO, 1995; AGUIAR & KARSHOLT, 2006, 2008).

***Palpita vitrealis* (Rossi, 1794).** 1, 13.06.2009, Baía das Cagarras, photos (Plate I: Fig. 3); attracted to light at night.

***Nomophila noctuella* (Denis & Schiffermüller, 1775).** 1, 13.06.2009, Baía das Cagarras, photos (Plate I: Fig. 4); attracted to light at night.

Sphingidae

***Agrius convolvuli* (Linnaeus, 1758).** 1, 19.05.2007, top of the island; feeding on nectar of *Sonchus oleraceus* L.; notes: "striped" abdomen with dull red markings clearly seen. New for the Selvagens Islands; there are records for Madeira Island, Porto Santo and Deserta Grande; it occurs also on the Canary Islands (AGUIAR & KARSHOLT, 2006, 2008).

***Macroglossum stellatarum* (Linnaeus, 1758).** 1, last week of June 2006; 1, 14.07.2006, Baía das Cagarras; 1, 28.07.2006, Baía das Cagarras (near the top); 1, 07.08.2006, Baía das Cagarras; 1, 08.08.2006, Baía das Cagarras; 1, 10.08.2006, Baía das Cagarras; 1, 02.09.2006, Baía das Cagarras; 1, 06.09.2006, Chão dos Caramujos.

***Hippotion celerio* (Linnaeus, 1758).** 1, 29.09.2007, Baía das Cagarras, photos (Plate I: Figs. 5-6); attracted to light at night. New for the Selvagens Islands; recorded from Madeira Island, Porto Santo, Deserta Grande and the Canary Islands (see AGUIAR & KARSHOLT, 2006, 2008).

Nymphalidae

***Vanessa atalanta* (Linnaeus, 1758).** 4, 10.08.2006, Baía das Cagarras (one of the individuals was feeding on *Solanum nigrum* L.); 1, 13.09.2007, top of the island; 1, 14.09.2007, top of the island; 1, 15.09.2007, Baía das Cagarras, photos (Plate III: Figs. 13-14); 1, 22.09.2007, Chão dos Caramujos; 1, 18.06.2008, Baía das Cagarras, photos (Plate III: Fig. 15). New for the Selvagens Islands (see AGUIAR & KARSHOLT, 2008).

***Vanessa cardui* (Linnaeus, 1758).** Abundant, 13-18.07.2006, throughout; 3, 06.08.2006, top of the island; 1, 08.08.2006, top of the island; 1, 09.08.2006, Baía das Cagarras (near the top); 1, 10.08.2006, Baía das Cagarras; 1, 13.08.2007, top of the island; 1, 14.09.2007, top of the island; 2, 22.09.2007, top of the island; 1, 27.09.2007, Chão dos Caramujos, was predated by a migrant *Oenanthe oenanthe* (L.); 1, 29.09.2007, Baía das Cagarras, photos; feeding on flowers of *Schizogyne sericea* (L. f.) DC.

Noctuidae

***Hypena obsitalis* (Hübner, 1813).** 1, 13.06.2009, Baía das Cagarras, photos (Plate II: Fig. 7); attracted to light at night. New for the Selvagens Islands; recorded from Madeira Island, Porto Santo and the Canary Islands (see AGUIAR & KARSHOLT, 2006, 2008).

***Eublemma parva* (Hübner, 1808).** 1, 13.06.2009, Baía das Cagarras, photos (Plate II: Fig. 8); attracted to light at night. In addition, two specimens collected in 2006 (both Selvagem Grande) are included in the Insect Collection of the Laboratório de Qualidade Agrícola of Madeira (ICLAM, Camacha, Madeira; unpublished data, A. F. Aguiar *in litt.*): 1 female

(over *Centaurea melitensis* L.), 23.05.2006, R. Pereira leg., A. F. Aguiar det. (ICLAM - 01171); 1 male, 27.05.2006, R. Pereira leg., A. F. Aguiar det. (ICLAM - 01172). New for the Selvagens Islands; recorded from Madeira Island, Deserta Grande and the Canary Islands (see AGUIAR & KARSHOLT, 2006, 2008).

***Caradrina clavipalpis* (Scopoli, 1763)**. 1, 13.06.2009, Baía das Cagarras, photos (Plate II: Fig. 9); attracted to light at night. New for the Selvagens Islands; recorded from Madeira Island and Porto Santo, where the endemic subspecies *C. c. pinkeri* Kobes 1975 is present; occurs also in the Canary Islands, where another subspecies is present (see AGUIAR & KARSHOLT, 2006, 2008); the subspecific status of the individual here reported is unknown.

***Agrotis cf. lanzarotensis* Rebel, 1894**. 1 male, 22.07.2007, Baía das Cagarras, photos (Plate II: Fig. 10); attracted to light at night. 1 male, 14.09.2007, Baía das Cagarras, photos (Plate II: Fig. 11); attracted to light at night. Synonymized with *A. selvagensis* Pinker & Bacallado, 1978 by AGUIAR & KARSHOLT (2006); occurs both in Selvagem Grande and Selvagem Pequena and also the Canary Islands (see AGUIAR & KARSHOLT, 2006, 2008).

Erebidae

***Utetheisa pulchella* (Linnaeus, 1758)**. 1, 27.09.2007, Chão dos Caramujos, photos (Plate II: Fig. 12); resting on *Mesembryanthemum crystallinum* L. Recorded also by STÜBEN (2016: 64). Not included in AGUIAR & KARSHOLT (2006, 2008).

Other noteworthy insects

ODONATA

Libellulidae

***Sympetrum fonscolombii* (Selys, 1840)**. 1 male, 08.07.2007, Baía das Cagarras, photos (Plate III: Fig. 16). Additionally, three specimens collected in Selvagem Grande are included in the ICLAM (unpublished data, A. F. Aguiar *in litt.*): 1 male, 11.05.2006, R. Pereira leg., A. F. Aguiar det. (ICLAM - 01145); 1 female, 13.05.2006, R. Pereira leg., A. F. Aguiar det. (ICLAM - 01144) and 1 male, 21.08.2011, F. Fernandes leg., A. F. Aguiar det. (ICLAM - 04099). New for the Selvagens Islands (see BORGES *et al.*, 2008; only 6 Odonata species are known from the whole Madeira region). The other species in genus *Sympetrum* present in the region, *S. nigrifemur* (Selys, 1884), is a regional endemism from the archipelagos of Madeira and Canaries, with very few records known from the Selvagens, all from Selvagem Grande (MALKMUS & WEIHRAUCH, 2010).

Sympetrum sp. 1 male, 10.08.2006, top of the island; 1, 02.09.2006, top of the island; "several dozens", first week of August 2007, top of the island (became scarcer towards mid-August).

ORTHOPTERA

Acrididae

***Sphingonotus caerulans* (Linnaeus, 1767)**. 1, 22.07.2007, Chão dos Caramujos, photos (Plate III: Fig. 17); notes: hind wings bluish-grey with no dark border; ca. 30 mm. Another species in genus *Sphingonotus*, *S. rubescens* Walker, 1870, has been recorded from the Selvagens (see BORGES *et al.*, 2008); both differ in the colour of the hindwings and shape of the *pronotum*, among other characters (see WALKER, 1870).

BLATTODEA

Blattidae

***Periplaneta americana* (Linnaeus, 1758)**. This is a common species within and around the anthropogenic structures on Baía das Cagarras; observed on most nights, from 2006 to 2009; photos (Plate III: Fig. 18). Although not included in the Selvagens fauna list by BORGES *et al.* (2008) there are previous mentions in literature for Selvagem Grande (see ARECHAULETA *et al.*, 2000). It is present also on Madeira Island and Porto Santo; another species in this genus, *P. brunnea* Burmeister, 1838, occurs on Madeira Island (BORGES *et al.*, 2008), but can be distinguished by the shape of the *cerci* and the colour of the *pronotum* (see BURMEISTER, 1838: 503).



1



2



3



4



5



6

Plate I – **1**) *Pyrausta sanguinalis* (Linnaeus), 17.06.2008; **2**) *Uresiphita gilvata* (Fabricius), 13.06.2009; **3**) *Palpita vitrealis* (Rossi), 13.06.2009; **4**) *Nomophila noctuella* (Denis & Schiffermüller), 13.06.2009; **5-6**) *Hippotion celerio* (Linnaeus), 29.09.2007.



Plate II – 7) *Hypena obsitalis* (Hübner), 13.06.2009; **8)** *Eublemma parva* (Hübner), 13.06.2009; **9)** *Caradrina clavipalpis* (Scopoli), 13.06.2009; **10)** *Agrotis lanzarotensis* Rebel, 22.07.2007; **11)** *A. lanzarotensis* Rebel, 14.09.2007; **12)** *Utetheisa pulchella* (Linnaeus), 27.09.2007.



13



14



15



16



17



18

Plate III – 13-14 *Vanessa atalanta* (Linnaeus), 15.09.2007; **15** *V. atalanta* (Linnaeus), 18.06.2008; **16** *Sympetrum fonscolombii* (Selys), 08.07.2007; **17** *Sphingonotus caeruleus* (Linnaeus), 22.07.2007; **18** *Periplaneta americana* (Linnaeus), 10.07.2007.

FINAL REMARKS

References in the literature to Lepidoptera for the Selvagens are scarce (all literature reviewed in AGUIAR & KARSHOLT, 2006), which could indicate simply that few species are present or occur on this small oceanic archipelago. However, the eight species of Lepidoptera here newly recorded from the Selvagens Islands represent a relatively high percentage of all species now known from the archipelago, 25% of all species recorded. This suggests there are several more species yet to be recorded, which should be particularly true for migrant species; specific weather conditions (e.g. winds, especially when coinciding with emergence or migration periods) may be favourable to the arrival of insects from the African mainland, to the east, from Madeira, to the north, or the Canaries, to the south. Regular monitoring using e.g. light traps at strategic points would most likely be effective for this purpose.

The fauna of insects of the Selvagens Islands is presently much better known than it was even by the middle of the last century. This is no doubt due to the cumulative efforts of many individual researchers and naturalists, to an easier accessibility and to the increasingly better logistic conditions, particularly on Selvagem Grande. However, there are still obvious knowledge gaps (as already stated by e.g. LOBO & BORGES, 2010 and BOIEIRO *et al.*, 2015), not only regarding the migratory species that irregularly reach these islands, but also the native and endemic species.

Some of those gaps became apparent if the full list of species presented by BORGES *et al.* (2008) is compared with the results presented by OROMI *et al.* (1978) and ARECHAULETA *et al.* (2000); several species included in these two last works were omitted from the full list, presumably because those species belong to groups that are currently under review (and thus would be premature to include such information), because some *taxa* were not determined to species in those papers, or because some records were perhaps too uncertain to be safely included; some may also have been considered to represent recent and not yet established accidental introductions. Unfortunately, those omissions may suggest some groups are not represented in the Selvagens at all, particularly to a non-specialist reader.

This is especially important in the Diptera: BORGES *et al.* (2008) included 9 species in 6 families for this Order, while OROMI *et al.* (1978) listed 14 additional *taxa* (some not determined to species) in 12 additional families (Agromyzidae: 2, Asilidae: 1, Calliphoridae: 2, Canacidae: 1, Chironomidae: 1, Ephydriidae: 1, Faniidae: 1, Phoridae: 1, Milichiidae: 1, Sarcophagidae: 1, Therevidae: 1 species, Trixoscelididae: 1); three of these *taxa* were recorded also by ARECHAULETA *et al.* (2000). The same can be said of the Hymenoptera: OROMI *et al.* (1978) listed *taxa* belonging to 3 families not represented in BORGES *et al.* (2008): Bethyliidae (1), Ichneumonidae (1 species), Proctorupidae (1), besides another species in genus *Biosteres* (Braconidae). To these should be added a species of Chrysopidae (Neuroptera), as well as *Periplaneta americana* (Linnaeus, 1758) (Blattodea; also recorded in the present work), and others such as at least another species of *Zygentoma* ("silver fish") mentioned by OROMI *et al.* (1978).

In turn, ARECHAULETA *et al.* (2000) recorded also *Reduvius personatus* (Linnaeus, 1758) (Hemiptera: Reduviidae; further reported by AGUIAR & CARVALHO, 2016: 87) and *Tropistethus seminitens* Puton, 1889 (Hemiptera: Lygaeidae); another two species (*Syntomus inaequalis* (Wollaston, 1863); Carabidae, and *Aphthona convexior* Lindberg, 1950; Chrysomelidae), each of them known from single specimens collected in Selvagem Grande, are considered problematic records by BORGES *et al.* (2008), apparently due to lack of suitable habitat (thus probably awaiting further confirmation; see also STÜBEN, 2016). Further to these, ARECHAULETA *et al.* (2000) included at least 6 insect *taxa* identified to genus level only (also not included in BORGES *et al.*, 2008), that may represent yet undescribed endemic *taxa*, namely 2 species of Psocoptera (*Cerobasis* sp., *Liposcelis* sp.), an undetermined Anobiinae (Coleoptera; see also VIÑOLAS & OROMÍ, 2000), two undetermined Curculionidae (one *Eremiarhinus* sp. = syn. *Entomoderus* sp. in STÜBEN, 2016; also recorded by STÜBEN, 2016: 56, as a potential new *taxon*; and one *Liparthrum* sp.) and one species of Diptera (*Machimus* sp.; Asilidae; already mentioned by OROMI *et al.*, 1978, and recently by AGUIAR & CARVALHO, 2016: 78). Finally, ARECHAULETA *et al.* (2000) recorded also several insects, determined only to genus level that, although not suspected to represent new species or endemisms, have no other members of such genera recorded for the Selvagens, namely *Malthinus* sp. (Coleoptera, Cantharidae), *Copidosoma* sp. and *Leptomastix* sp. (Hymenoptera, Encyrtidae), *Diachasma* sp. (Hymenoptera, Braconidae) and *Idris* sp. (Hymenoptera, Scelionidae); despite being specifically undetermined, these represent at least 5 additional *taxa*.

Finally, AGUIAR & CARVALHO (2016), from the study of the insect collection of the old Funchal Seminary Museum of Natural History (specimens collected 1938-1944), added 3 further *taxa* collected on the Selvagens: 1 Bombyllidae (Diptera: *Phthiria* sp.), 1 Lygaeidae (Heteroptera: unidentified *taxon*), 1 Braconidae (Hymenoptera: *Apanteles* sp.).

In short, those *taxa* included by OROMI *et al.* (1978), ARECHAVALETA *et al.* (2000) and AGUIAR & CARVALHO (2016) may represent a minimum of 38 additional species, or the equivalent to one quarter of all species considered in BORGES *et al.* (2008) for the Selvagens; together with the remainder of the species recorded in this note, the resulting total number of insect species for the Selvagens would thus now stand at 214. This information is potentially useful for studies focusing on the biodiversity of these islands (*e.g.* for biogeographic comparative purposes); the potential number of yet undescribed endemic species may as well indicate to researchers which *taxa* are most in need of further sampling. The above-mentioned knowledge gaps regarding the insect fauna of the Selvagens Islands clearly highlight the need for more faunistic research to take place in this archipelago.

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REFERENCES

- ACHTERBERG, C. Van & A. M. F. AGUIAR:
2009. Additions to the fauna of Braconidae from Madeira and Selvagens Islands, with the description of five new species (Hymenoptera: Braconidae: Homolobinae, Alysiniinae, Opiinae). *Zoologische Mededelingen Leiden*, **83** (22): 777-797.
- AGUIAR, A. M. F. & J. A. CARVALHO:
2016. A catalogue of the surviving insect collection of the old Funchal Seminary Museum of Natural History. *Boletim do Museu de História Natural do Funchal*, **66** (346): 41-95.
- AGUIAR, A. M. F., D. CRAVO, D. L. QUEIROZ & D. BURCKHARDT:
2019. The jumping plant-lice of Madeira Archipelago and Selvagens Islands (Hemiptera: Psylloidea) – new records, updated checklist and notes on some natural enemies. *Entomologist's Monthly Magazine*, **155** (2): 113-126.
- AGUIAR, A. M. F., F. A. ILHARCO, M. KHADEM & M. MOREIRA:
2013. New records of aphids (Hemiptera: Aphidoidea) from Madeira and Azores archipelagos. *Entomologist's Monthly Magazine*, **149** (9): 235-254.
- AGUIAR, A. M. F. & O. KARSHOLT:
2006. Systematic catalogue of the entomofauna of the Madeira Archipelago and Selvagens Islands. Lepidoptera, Vol. 1. *Boletim do Museu Municipal do Funchal*, **Supl. 9**: 5-140.
2008. Lepidoptera. In: Borges, P. A. V., C. Abreu, A. M. F. Aguiar, P. Carvalho, R. Jardim, I. Melo, P. Oliveira, C. Sérgio, A. R. M. Serrano & P. Vieira (eds.). *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Pp. 339-345. Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo.
- ALONSO, H., R. MATIAS, J. P. GRANADEIRO & P. CATRY:
2008. Moults strategies of Cory's Shearwaters *Calonectris diomedea borealis*: the influence of colony location, sex and individual breeding status. *Journal of Ornithology*, **150** (2): 329-337.
- ARECHAVALETA, M., N. ZURITA & P. OROMI:
2000. Nuevos datos sobre la fauna de artrópodos de las Islas Salvajes. *Revista de la Academia Canaria de Ciencia*, **XII** (3-4): 83-99.
- ASSING, V.:
2000. A new species of Oligota MANNERHEIM from the Ilhas Selvagens (Insecta: Coleoptera: Staphylinidae: Aleocharinae). *Reichenbachia*, **33** (37): 317-319.
- BELLÉS, X.:
2001. Description of *Sphaericus selvagensis* n. sp. from the Salvage Islands, and new data on *Sphaericus bicolor* Bellés (Coleoptera, Ptinidae). *Animal Biodiversity and Conservation*, **24.1**: 9-13.
- BOIEIRO, M., A. F. AGUIAR, C. REGO, P. A. V. BORGES & A. R. M. SERRANO:
2015. The biodiversity of terrestrial arthropods in Madeira and Selvagens archipelagos. *Revista IDE@-SEA*, **6 B**: 1-20.

- BORGES, P. A. V., C. ABREU, A. M. F. AGUIAR, P. CARVALHO, R. JARDIM, I. MELO, P. OLIVEIRA, C. SÉRGIO, A. R. M. SERRANO & P. VIEIRA (eds.):
2008. *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo, 440 pp.
- BURMEISTER, H.:
1838. *Handbuch der Entomologie*. Theod. Chr. Friedr. Enslin, Berlin. Vol. **2** (2): 397-756.
- CARVALHO, J. P.:
1995. Microlepidoptera of the Madeira and Selvagem Archipelagos (Insecta, Lepidoptera). *Boletim do Museu Municipal do Funchal*, **Supl. 4**: 559-588.
- ERBER, D. & C. PH. WHEATER:
1987. The Coleoptera of the Selvagens Islands, including a catalogue of the specimens in the Museu Municipal do Funchal. *Boletim do Museu Municipal do Funchal*, **39**: 156-187.
- EVERS, A. M.:
1981. *Ifnidius atlanticus* n. sp. (Col., Malachiidae) von den Selvagens-Inseln. *Entomologische Blätter*, **77** (3): 155-157.
- FAUVEL, A.:
1897a. Catalogue des Coléoptères des Iles Salvages. *Revue d'Entomologie*, **16**: 74-75.
1897b. Catalogue des Staphylinides de Barbarie et des Iles Açores, Madères, Salvages et Canaries (4e. édition). *Revue d'Entomologie*, **16**: 237-371.
- FEA, L.:
1883. Le crociere dell'yacht Corsaro del Capitano armatore Enrico D'Albertis; V. Colleotteri. *Annali del Museo Civico di Storia Naturale di Genova*, **18**: 759-774.
- GARRETA, L.:
1911. Les insectes de l'île Grande Salvage. *Bulletin de la Société entomologique de France*, **16** (20): 392-397.
- HUNDSDOERFER, A. K., K. M. LEE, I. J. KITCHING & M. MUTANEN:
2019. Genome-wide SNP data reveal an overestimation of species diversity in a group of hawkmoths. *Genome Biology and Evolution*, **11** (8): 2136-2150.
- KRATOCHWIL, A., J. SMIT & A. F. AGUIAR:
2018. Updated checklist of the wild bees of the Madeira Archipelago and the Selvagens Islands (Hymenoptera: Apoidea: Anthophila). *Linzer Biologische Beiträge*, **50** (2): 1213-1228.
- LOBO, J. M. & P. A. V. BORGES:
2010. The provisional status of terrestrial arthropod inventories in the macaronesian islands. In: Serrano, A. R. M., Borges, P. A. V., Boieiro, M. & P. Oromí (eds.) (2010). *Terrestrial Arthropods of Macaronesia – biodiversity, ecology and evolution*. Sociedade Portuguesa de Entomologia, Lisboa, pp. 33-47.
- MALKMUS, R & F. WEIHRAUCH:
2010. Verbreitung und Phänologie von *Sympetrum nigrifemur* auf den Makaronesischen Inseln (Odonata: Libellulidae). *Libellula*, **29** (1/2) 2010: 91-106.
- MATIAS, R., R. REBELO, J. P. GRANADEIRO & P. CATRY:
2009. Predation by Madeiran Wall Lizards *Teira dugesii* on Cory's Shearwater *Calonectris diomedea* hatchlings at Selvagem Grande, North Atlantic. *Waterbirds*, **32**: 600-603.
- MEYER, M.:
1997. Die Lepidopteren der makaronesischen Region VII: Die Pyraliden fauna Madeiras und der Azoren (Microlepidoptera, Pyralidae). Kommentierte Checkliste und aktueller Stand der Revision. *Verhandlungen Westdeutscher Entomologentag*, (1996): 45-59.
- OROMI, P.:
1983. Sobre el origen de la fauna entomológica de las Islas Salvajes. *Vieraea*, **12**: 271-293.
- OROMI, P., M. BAEZ, A. MACHADO:
1978. Contribución al estudio de los Artrópodos de las Islas Salvajes. In Museo de Ciencias Naturales del Cabildo Insular de Santa Cruz de Tenerife (ed.). *Contribución al estudio de la Historia Natural de las Islas Salvajes. Resultados de la Expedición Científica "Agamenón 76" (23 de Febrero-3 de Marzo de 1976)*. Aula de Cultura de Tenerife, Santa Cruz de Tenerife, pp. 177-194.
- PICKERING, C. H. C. & G. E. MAUL:
1964. Scientific expedition to the Salvage Islands. *Boletim do Museu Municipal do Funchal*, **73**: 129-131.

PITA, M. T., I. SILVA, D. MENEZES & A. GOMES:

2009. On the syrphid fauna of the Madeira Archipelago and the Salvage Islands, with some first records from Deserta Grande and Selvagem Grande (Diptera: Syrphidae). *Boletín Sociedad Entomológica Aragonesa*, **44**: 425-433.

QUARTAU, J. A.:

1975. On the origin of two flatids (Homoptera, Auchenorrhyncha) of the Salvage Islands. *Bocagiana*, **37**: 1-8.

1981a. Missão zoológica dos arquipélagos da Madeira e das Selvagens. *Arquivos do Museu Bocage* (Série C), **1** (1): 1-32.

1981b. On a new species of the genus *Brachypteron* Lindberg (Homoptera: Cicadellidae) from the Salvage Islands. *Arquivos do Museu Bocage* (Série B), **1** (10): 125-132.

SILVA, M. C., R. MATIAS, R. M. WANLESS, P. G. RYAN, B. M. STEPHENSON, M. BOLTON, N. FERRAND & M. M. COELHO:

2015. Understanding the mechanisms of anti-tropical divergence in the seabird White-faced Storm-petrel (Procellariiformes: *Pelagodroma marina*) using a multi-locus approach. *Molecular Ecology*, **24**: 3122-3137.

SOUSA, A. B.:

1984-85. Lepidoptera Papilionoidea dos Arquipélagos da Madeira e Selvagens. *Boletim da Sociedade Portuguesa de Ciências Naturais*, **22**: 47-53.

STÜBEN, P. E.

2016. *The Coleoptera of the Salvage Islands*. Curculio Institute, Moenchengladbach, 120 pp.

2017. Die Curculionoidea (Coleoptera) von den Inseln Madeiras und den Selvagens. *SNUDEBILLER, Studies on taxonomy, biology and ecology of Curculionoidea*, **18** (261): 92 pp.

VIÑOLAS, A. & P. OROMÍ:

2000. Nuevos datos sobre los Anóbidos de las Islas Salvajes (Coleoptera: Anobiidae). *Revista de la Academia Canaria de Ciencia*, **XII** (3-4): 101-104.

WALKER, F.:

1870. List of the Dermaptera discovered by J. K. Lord, Esq., in Egypt, and in the adjoining regions; with descriptions of the new species. *The Zoologist*, **2** (5): 2296-2303.

WOLLASTON, T. V.:

1854. *Insecta Madeirensia; being an account of the Insects of the islands of the Madeira group*. London. 634 pp.

1860. On the Coleoptera of the Salvages. *Journal of Entomology*, **2** (1): 84-93.

1865. *Coleoptera Atlantidum*, London. 526 pp.

ZINO, P. A.:

1985. A short history of the shearwater hunt on the Great Salvage and recent developments on this island. *Bocagiana*, **84**: 1-9.

Appendix 1

Systematic list of the Insects endemic to the Selvagens Islands, according to BORGES *et al.* (2008), updated with ACHTERBERG & AGUIAR (2009) and STÜBEN (2016, 2017)

A total of 31 insect *taxa* are currently known that are endemic to the Selvagens: 28 are endemic species, 3 are endemic subspecies (signaled with *); in the case of *Deucalion oceanicum* Wollaston the genus is endemic as well. **NOTES:** (1) Both subspecies of the endemic *Laparocerus garretai* Uyttenboogaart may prove to be separate species (STÜBEN, 2016, 2017). (2) The nomenclature and taxonomy of the Coleoptera are updated with STÜBEN (2016). The following *taxa* were formerly treated as endemic subspecies of the Selvagens Islands (*in* BORGES *et al.*, 2008), but due to synonymization with *taxa* with wider distribution can no longer be considered unique to these islands and thus are not included in this list, namely (3) *Amaurorhinus clermonti salvagis* Folwaczny, 1972 was synonymized by STÜBEN (2016: 44) with the nominate *taxon* (which has a vast distribution); (4) similarly, *Pentatemnus arenarius incognitus* Osella, 1978, was synonymized with *Pentatemnus arenarius* Wollaston, 1861 (which occurs in the Canaries) by STÜBEN (2016); (5) *Orthomus barbarus haligena* (Wollaston, 1860) is considered a synonym of *Orthomus berytensis* (Reiche & Saulcy, 1854), which has a vast distribution, by ARECHAVALETA *et al.* (2000) and STÜBEN (2016). (6) A species included in STÜBEN (2016) as *Entomoderus cf. brevitarsis* (Wollaston) may prove to be a distinct, undescribed and endemic species, and is pending further research. (7) genus *Salvagopselactus* Folwaczny is currently treated as a Selvagens endemic, but its status is under review (*in* STÜBEN, 2016).

Order Zygentoma

Lepismatidae

Neoasterolepisma pelagodromae Mendes, 1988

Order Hemiptera

Cicadellidae

Brachypteron vieirai Quartau, 1981

Flatidae

Cyphopterus quartau Linnavuori, 1974

Cyphopterus salvagensis Lindberg, 1959

Miridae

Phytocoris salvagensis J. Ribes, 1978

Order Thysanoptera

Phlaeothripidae

Haplothrips dilatipennis zur Strassen, 1965

Order Coleoptera

Anobiidae

Sphaericus bicolor Bellés, 1982

Sphaericus salvagensis Bellés, 2001

Carabidae

Cymindis paivana (Wollaston, 1860)

Nesacinopus pelagicus (Wollaston, 1860)

Cerambycidae

Deucalion oceanicum Wollaston, 1854

Curculionidae

Aeoniacalles neptunus Wollaston, 1854 (synonymized with *Acalles neptunus* Wollaston, 1854 by STÜBEN, 2016)

Ficusacalles oceanicus, Stueben 2002 (upgraded to species and synonymized with *Acalles senilis oceanicus* Stueben, 2002 by STÜBEN, 2016)

Echinodera pallida Israelson, 1985

Laparocerus garretai Uyttenboogaart, 1940

* *Laparocerus garretai garretai* Uyttenboogaart, 1940 (Selvagem Grande)

* *Laparocerus garretai albosquamosus* Machado, 2011 (Selvagem Pequena)

Leipommata oromiana Osella, 1978

Salvagopselactus maui Folwaczny, 1972

Dasytidae

Aplocnemus zinoi Stueben, 2016

Elateridae

Coptostethus oromii Cobos, 1978 (synonymized with *Cardiophorus oromii* Cobos, 1978 by STÜBEN, 2016)

Malachiidae

Attalus oceanicus Evers, 1971

Ifnidius atlanticus Evers, 1981

Staphylinidae

Leptobium paivae (Wollaston, 1865)

Oligota selvagensis Assing, 2000

Tenebrionidae

Gonocephalum dilatatum (Wollaston, 1854)

Hegeter latebricola (Wollaston, 1854)

Nesotes leacoccianus (Wollaston, 1854)

Nesotes monodi Alluaud, 1935

Trogossitidae

* *Leipaspis caulicola oceanica* Wollaston, 1865

Order Hymenoptera

Braconidae

Phaedrotoma flaveola van Achterberg & Aguiar, 2009

Appendix 2

Systematic list of the Lepidoptera recorded from the Selvagens Islands, according to AGUIAR & KARSHOLT (2006, 2008), STÜBEN (2016) and this work (newly recorded species are marked with *).

NOTES: (1) Another species, *Udea maderensis* (Bethune-Baker, 1894), has been mentioned from Selvagem Grande (19.05.1980) by CARVALHO (1995); it was considered doubtful or in need for confirmation by AGUIAR & KARSHOLT (2006) and thus not included in the list below (see also MEYER, 1997: 50). (2) *Hyles euphorbiae* (Linnaeus, 1758) has been cited from the Selvagens Islands (AGUIAR & KARSHOLT, 2008: 344), under the synonym *Hyles tithymali* (Boisduval, 1834); see HUNDSDOERFER *et al.* (2019) for synonymy. However, the species has in fact not been recorded in the archipelago, and its inclusion in that work results from a typographical error (A. F. Aguiar *in litt.*).

Tineidae

Trichophaga bipartitella (Ragonot, 1892)

Trichophaga robinsoni Gaedike & Karsholt, 2001

Tortricidae

Acroclita subsequana (Herrich-Schäffer, 1851)

Selania leplastriana (Curtis, 1831)

Pterophoridae

Agdistis bifurcatus Agenjo, 1952

Agdistis salsolae Walsingham, 1908

Pyralidae

Ancylosis roscidella (Eversmann, 1844)

Crambidae

* *Pyrausta sanguinalis* (Linnaeus, 1767)

* *Uresiphita gilvata* (Fabricius, 1794)

Palpita vitrealis (Rossi, 1794)

Nomophila noctuella (Denis & Schiffermüller, 1775)

Sphingidae

* *Agrius convolvuli* (Linnaeus, 1758)

Macroglossum stellatarum (Linnaeus, 1758)

Hyles livornica (Esper, 1779)

* *Hippotion celerio* (Linnaeus, 1758)

Nymphalidae

* *Vanessa atalanta* (Linnaeus, 1758)

Vanessa cardui (Linnaeus, 1758)

Vanessa vulcania Godart, 1819

Noctuidae

Cryphia simonyi (Rogenhofer, 1889)

* *Hypona obsitalis* (Hübner, 1813)

Autographa gamma (Linnaeus, 1758)

Trichoplusia ni (Hübner, 1803)

* *Eublemma parva* (Hübner, 1808)

Heliothis peltigera (Denis & Schiffermüller, 1775)

Helicoverpa armigera (Hübner, 1808)

* *Caradrina clavipalpis* (Scopoli, 1763)

Spodoptera exigua (Hübner, 1808)

Cardepija deserticola antinea Rungs, 1972

Euxoa canariensis Rebel, 1902

Agrotis lanzarotensis Rebel, 1894

Agrotis segetum (Denis & Schiffermüller, 1775)

Erebidae

Utetheisa pulchella (Linnaeus, 1758)